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EXAMINER

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/758,540
Filing Date: January 16, 2004
Appellant(s): KRON ET AL.

Willem F.C. de Weerd
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 1-26-2009 and 4-6-2009 appealing from the Office action mailed 8-21-2009.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is generally correct.

The examiner, however, disagrees with the applicants statement that the claimed "processes provide an efficient method of eliminating or reducing residual monomers from expandable thermoplastic microspheres without causing significant discoloration problems, providing expandable thermoplastic microspheres with both high brightness and low residual monomer content, without negatively affecting important properties of the microspheres, such as expandability. Id., page 2, lines 4-7 and 36-38", since none of those characteristics, with the exception of specific % of the brightness retention claimed in claims 22 and 23, are claimed in any of the process claims.

Further, the examiner disagrees with the statement that "the expandable thermoplastic microspheres of independent claims 17, 18, and 20 can be obtained by the processes according to independent claims 1 and 2 and have both high brightness

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and low residual monomer content, while important properties of such microspheres, for example expandability, are retained, *Id.*, page 7, lines 18-21”, as none of the product claims 18,18 or 19 are claimed in the “product-by-process” form that requires the steps of the claimed process.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant’s statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

4,287,308	Nakayama et al.	9-1981
4,255,307	Miller	3-1981

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 4,287,308 to Nakayama et al., (hereinafter “Nakayama”) in combination with US Patent 4,255,307 to Miller, (hereinafter “Miller”)

Nakayama discloses a process for production of expandable thermoplastic microspheres, which microspheres contain very little amount of residual monomer in the shell, the process includes a step of contacting microspheres comprising a thermoplastic polymer shell encapsulating a propellant, the shell is obtained by polymerizing ethylenically unsaturated monomers and comprising residual monomers, with an agent reacting directly or indirectly with at least part of said residual monomers, thus substantially reducing the amount of residual monomers in the polymeric shell.

Specially, the shell is obtained by polymerizing acrylonitrile monomers (ethylenically unsaturated monomers) which encapsulate a propellant, column 2, lines 30-45, and the shell contains residual unreacted acrylonitrile monomer. The unreacted acrylonitrile monomers contained in the shell are eliminated from the shell via cyanoethylation reaction with a compound (agent) suitable for cyanoethylation reaction with acrylonitrile. Column 2, lines 19-29, illustrative examples.

The reference further teaches that the reacting of the microspheres with the agent can be done at any stage between polymerization and washing, or after washing. Column 3, lines 43-49. Thus, reacting the microspheres prior washing in the reaction slurry as per claims 7 or 14 would have been obvious from the disclosure of the Nakayama reference with reasonable expectation of adequate results absent showing of unexpected results that can be clearly attributed to conducting reaction in polymerization slurry.

Nakayama discloses wide variety of suitable agents for reducing acrylonitrile content of the polymeric shell, such as sulfides, sulfates, etc., column 3, lines 11-14 and

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table 1. The reference does not disclose the claimed silfites (i.e., a compounds having a Sulfur atom having at least one free electron pair and binding three oxygen atoms) as being suitable agents for reacting with residual monomers.

Miller discloses that silfites that fully correspond to the claimed agents are indeed, known agents that can be used to reduce residual monomers in acrylonitrille based polymers so that the residual level of the monomers is very low. See, for example, column 4, lines 9-15. The disclosure of Miller expressly teaches that using sulfites results in effective removal of acrylonitrille from acrylonitrille based polymers via reaction of cyanoethylations. Thus, it would have been obvious to use agents disclosed by Miller in the process disclosed by Nakayama as functional equivalents of the agents disclosed by Nakayama with reasonable expectation of adequate results, since as discussed above, the silfiteds disclosed in Miller are known for it function of reducing residual monomers in acrylonitrille based polymers (polymers identical to those disclosed in Nakayama) via the same chemical reaction of cyanoethylation with acrylonitrile (monomer identical to the monomer eacted and removed in Nakayama). Once such substitution is made, the resulting product will, inherently, exhibit the claimed properties.

(10) Response to Argument

The applicants argue on page 4 of the Brief that The Final Office action does not present a Prima Facie case of obviousness (paragraph c. of the arguments). The applicants argue that none of the references alone or in combination disclose all of the limitations of claims 1-23, and that none of the “cited references disclose or suggest to a

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skilled artisan, reducing the amount of residual acrylonitrile monomers in the polymeric shell of an expandable thermoplastic microsphere using oxo acids of sulfur, salts and derivatives thereof, comprising at least one sulfur atom having at least one free electron pair and binding three oxygen atoms, including sulfites as sulfur-containing agents, **while retaining its expandability and color**. Therefore, even if the cited references are combined, the resulting combination would not disclose or suggest the presently claimed invention.” (Emphasis original).

Insofar as the appellants arguments that the references alone or in combination fail to suggest all of the limitations of claims 1-23, the examiner clearly set forth the rejection above addressing all of the claim limitations. While the examiner agrees that none of the references taken **alone** meet all of the claimed limitations, the combined teachings of the two cited references clearly meet all of the claimed limitations, i.e, the primary reference, Nakayama, meets all of the claimed limitations with the exception of specifically claimed reactive agent, which limitations of the agent is met by the disclosure of Miller. See discussion above, in the body of the rejection.

Insofar as the references alone or in combination not suggesting "reducing the amount of residual acrylonitrile monomers in the polymeric shell of an expandable thermoplastic microsphere using oxo acids of sulfur, salts and derivatives thereof, comprising at least one sulfur atom having at least one free electron pair and binding three oxygen atoms, including sulfites as sulfur-containing agents, **while retaining its expandability and color**", it is stated for the record that NONE of the claims requires retention of expandability and color (note that even the dependent claims that recite

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physical properties of the microspheres recite “brightness”, not color). While such results, i.e, expandability and color retention may be unexpected results of the **claimed** process, showing of unexpected results have nothing to do with establishing of prima facie case of obviousness.

Therefore, the appellants’ arguments that “even if the cited references are combined, the resulting combination would not disclose or suggest the presently claimed invention” are not pertinent to the question of whether or not the prima facie case was established by the Office, since those properties are NOT a part of the claimed invention.

In paragraph d., pages 5-6 of the Brief, the appellants do not provide ANY arguments regarding alleged errors committed by the Office in establishing prima facie case of obviousness or in discussion of the teachings of the cited references, rather the applicants re-state or interpret the rejections and arguments set forth by the examiner in the previous Office Actions. Thus, whether or not the examiner agrees with the appellants' interpretation of the rejections or arguments presented by the examiner in the previous office action, this section is irrelevant from the point of view of providing any substantive arguments, as such are lacking in the entire section d.

In section e., the appellant, argue that they disagree with the examiners conclusion that “it would have been obvious to use agents disclosed by Miller in a process disclosed by Nakayama et al. as functional equivalents. Although Nakayama et al. disclose several agents for eliminating acrylonitrile monomers from expandable microspheres, there is no teaching regarding other effects by using such agents, such

as **discoloration or reduction of the expansion capabilities** of the microspheres.”

Once again, the motivation to combine the reference, i.e., obviousness of using agents disclosed in Miller in the invention of Nakayama has nothing to do with the properties not claimed in the instant process claims. Therefore, all applicants arguments that using of agents disclosed in Miller in the process of Nakayama results in both effective removal of residual monomer AND no discoloration or other adverse effects bear little or not weight for establishing of prima facie case of obviousness or finding a motivation to use agents of Miller in the process of Nakayama. Such motivation is expressly discussed in the body of the rejection, i.e., using a known compound for cyanoethylation reaction with identical monomer (i.e.e, to conduct reaction chemically identical to the reaction of Nakayama) for removal of such monomer from identical polymer with reasonable expectation of success. It is also noted, that the motivation to combine the teachings of references does not have to be the same as disclosed by the appellants.

Appellants further argue that while Nakayama discloses various cyanoethylation agents, including sulfides, the claimed sulfites are not disclosed. This statement is correct and that is exactly why the examiner modified teachings of Nakayama with the teachings of Miller.

Three appellants further argue that “Nakayama et al disclose that their most preferred cyanoethylation agents are primary lower amines or primary alkanolamines (see *Nakayama et al.*, Table 1 and col. 3, lines 40-42). All of the members of this class of cyanoethylation agents perform better than most other agents in reducing residual monomer from the expandable microsphere. The Examiner acknowledges that the

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sulfur-containing agents disclosed in Nakayama et al. do not perform optimally as compared with other agents in Nakayama et al.'s process for preparing thermo-expandable microspheres.” This argument is, at best, not understood at all. The silfides (such as sodium sulfide) whether or not the most effective compounds, are expressly disclosed among particularly preferred cyanoethylation compounds of Nakayama at the two line just above the lines quoted by the applicants as citing the most preferred compounds, i.e., column 3, lines 38-39.

Appellants expressly state on the record that “the cyanoethylation agents in Nakayama et al. reduce the amount of residual monomer in the expandable microsphere while maintaining other crucial properties of the thermoplastic microsphere, such as the **expandability** of the thermoplastic microsphere.” Thus he appellant agree that Nakayama already discloses the process of removal of residual monomer while maintaining other properties of the microspheres.

The appellants further state that in contrast “Miller discloses the use of sulfites in reducing residual acrylonitrile amounts in **aqueous dispersions**, which may comprise polymeric "latices" based on acrylonitrile. The Examiner does not dispute that the properties and characteristics of the aqueous dispersions disclosed in Miller are very different from the expandable microspheres taught in Nakayama et al. The expandable microspheres in Nakayama et al. as well as in the claimed invention have specific characteristics that are **not** present in the polymers described in Miller.” The examiner aggress with the statement that polymer lattices and microspheres as the final product, indeed, exhibit completely different physical properties. However, the examiner

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maintains her position that such physical properties, are irrelevant for the proposed substitution of agent disclosed in Nakayama with the agents disclosed in Miller. The substitution is related to a CHEMICAL cyanoethylation reaction of identical monomer (acrylonitrile) contained in identical polymer (acrylonitrile based polymer) with identical purpose to remove such residual monomer from the polymer by cyanoethylating it with a known agent. The difference between polymer disclosed in Nakayama and the polymer disclosed in Miller is, in essence, a shape of the polymer product – one is formed into a microsphere and another is a small polymer particle. The chemical reaction of the residual monomer contained in either one of the “shaped products” does Not depend on the physical shape of the polymeric product.

The appellans further argue that “Table 1 of the present invention clearly illustrates that certain agents that react with the residual acrylonitrile and alkylacrylonitriles compromise the **color and expandability** of the resulting microsphere. Such agents that compromise important characteristics of the resulting microspheres include **sulfur-containing agents**, such as diphenyl sulfoxide. In addition, Nakayama et al. recognized that maintaining expandability is an important requirement for the chosen agents to reduce the amount of residual acrylonitrile and teaches or suggests that the sulfur-containing agents (sulfide and sulfates) are not performing optimally in the described process. The skilled artisan therefore would not have been motivated to replace the agents disclosed in Nakayama et al. **to reduce the amount of residual acrylonitrile in the polymeric shell of the expandable microspheres with the sulfur-containing agents (sulfites)** as in the claimed

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invention.” It is not seen how this argument is even relevant to the rejection. All the examiner proposed is to use a known cyanoethylation agent (which is identical to the claimed agent) in invention of Nakayama in place of expressly disclosed agents, such as sodium sulfide. Just because some other cyanoethylation agents among thousands known in the art (such as diphenyl sulfoxide) may cause some undesirable results if used in invention of Nakayama has nothing to do with the rejection, proposed substitution of agents disclosed by Nakayama with the agents disclosed by Miller, or with the teachings of either Nakayama or Miller. None of the agents causing undesirable effect (as per table 1 of the instant invention) are even disclosed as suitable agents in either Nakayama or Miller. They are only disclosed in the instant specification. The only sulfur containing agent disclosed by Nakayama is sodium sulfide (table 1 of Nakayama), and this agent does NOT cause undesirable poor expansion problems as evident from the appellants own data in table 1. In essence, from the teachings of Nakayama, one of ordinary skill in the art would not even be aware of the expansion problem that some of the cyanoethylation agent may cause, since none of such agents are exemplified by Nakayama or such problem even discussed in Nakayama.

The appellants further argue that the “ Examiner's arguments do not establish why it would be obvious to a person skilled in the art to select the sulfur-containing agents of the present invention in favor of all substances known to react with monomers in the absence of any clear advantages.” This argument is not consistent with the current law on this subject. No specific advantage is needed for substituting one known

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substance for another when both substances are known as functional equivalents for the same purpose. He proposed substitution is nothing more than a "Simple substitution of one known element for another to obtain predictable results", i.e., a rationale supported by the recent decisions of the courts and that all the motivation needed to establish the prima facie case of obviousness, regardless of whether or not the prior art recognized or even addressed any additional problems or advantages resulting from such substitution.

In paragraph f. the appellants argue that the claimed invention provides some unexpected results, such as good expansion and brightness when compared to the embodiments of Nakayama which use sodium sulfide. The appellants state that "when the current invention uses sodium sulfide, as in Nakayama et al., to reduce the amount of residual monomer in the expandable microsphere, brightness is reduced. Unexpectedly, the use of other sulfur-containing agents (sulfites, and belonging to a different subclass of sulfur-containing agents) as in the claimed invention both significantly reduces the amount of residual monomer in the expandable microsphere while simultaneously retaining a high brightness (see Table 1 of the present specification)." The only result in Table 1 of the instant specification using sodium sulfide (as in Nakayama) shows "dark red color and bad smell". (See table 1 of the instant invention). As previously discussed, this result is COMPLETELY expected when using sodium sulfide as this agent is, by itself, of a of a dark red or yellow color (see evidence provided in the office action dated 3/15/2006, i.e. a page from a Chemical Dictionary), and sulfidies have NOTORIOUSLY bad smell as extremely well known to

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any chemist. Sulfites, on the other hand – are white and non-smelly. (see the same evidence). In other words, no problem of bad expansion is even associated with use of sodium sulfide, and the bad smell and color are completely expected from the smell and color of the sodium sulfide reactant as compared to a sulfite reactant, while both reactants effectively reduce the residual monomer. There is absolutely nothing unexpected that can be attributed to the proposed substitution of sulfide with a sulfate, and everything shown by the appellants is completely known and expected. Therefore, the established prima facie case of obviousness can not be rebutted by the allegedly unexpected results as the results presented on the record are fully expected and known to an ordinary artisan.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/ Irina S. Zemel/

Primary Examiner, Art Unit 1796

Conferees:

/James J. Seidleck/

Supervisory Patent Examiner, Art Unit 1796

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